

## ELASTIC COUPLING

### Background of the Invention

5 The present invention relates to an elastic coupling having two coupling parts that are rotatable relative to one another and engage one another via elastomeric elements.

Such elastic couplings are used in order, in a unit, to connect drive motors with a work machine or with a transmission. In a number of applications, a planned or unplanned stoppage of the drive motor results in a considerable interruption in production in the unit or plant, accompanied by correspondingly high costs. The coupling manufacturers specify regular inspections in their operating manuals in order to check the wear condition of the elastomeric elements in such couplings and hence, by timely replacement of the elastomeric elements, to prevent an unplanned interruption or a shutdown of the unit.

15 In addition to the interruption in production, the stoppage of the drive motor, for the purpose of checking the wear condition of the elastomeric elements, means a considerable assembly effort, since the drive motor must be protected against an unintentional activation, and the coupling guard, which is prescribed by official guidelines for the

protection against rotating components, must be disassembled and after the wear measurement must again be reassembled.

5 The elastomeric elements, depending upon their use, generally have an expected service life of between three and eight years. The inspection is prescribed in conformity with the length of operation or also in fixed time intervals, for example yearly. In this connection, the rotational play of the coupling is determined with the drive and the coupling stopped, whereby a coupling component is rotated without torque, until it is limited by a stop, and a marking is applied to both  
10 coupling parts. By rotating the coupling part in the opposite direction of rotation until it is limited by a stop, the markings move apart. The distance between the markings provides a visible indication of the rotational play, in which the wear of the elastomeric elements plays a part.

15 It is therefore an object of the present invention to provide an elastic coupling of the aforementioned general type that enables the measurement of the wear condition of the elastomeric elements when the coupling is rotating.

### Brief Description of the Drawings

This object, and other objects and advantages of the present invention, will appear more clearly from the following specification in conjunction with the accompanying schematic drawings, in which:

- 5            Fig. 1    shows, partially in a longitudinal cross section and  
                 partially in a side view, one exemplary embodiment of  
                 an inventive elastic coupling;
- Fig. 2    is a detailed view of the encircled portion Z of Fig. 1;  
                 and
- 10           Fig. 3    shows a coupling having a coupling guard.

### Summary of the Invention

             The elastic coupling of the present application comprises a first  
coupling part; a second coupling part, wherein the two coupling parts  
15           are rotatable relative to one another, and engage one another via  
             elastomeric elements, wherein a coupling gap remains between the  
coupling parts; a marking disposed on the outer edge of one of the  
coupling parts; and an indicator plate disposed on the outer edge of the  
other of the coupling parts, wherein the marking and indicator plate  
20           serve for a determination of a relative angle of torque of the coupling  
             parts, wherein the marking and indicator plate are disposed on the

coupling parts such that they are centered relative to one another, and wherein the marking and indicator plate abut the coupling gap.

5 A marking and an indicator plate on the rotating coupling parts can be made visible by suitable means, for example via a strobe light having an infinitely adjustable flash frequency. If the flash frequency of the strobe light is synchronized with the speed of the coupling, the marking and the indicator plate appear to stand still for an observer. The relative displacement of the coupling parts, which results from the angle of torque, can be obtained from the indicator plate. The relative  
10 displacement represents the sum of joint play resulting from assembly, elastic deformation of the elastomeric elements due to the torque load, as well as the wear of the elastomeric elements. Thus, the wear of the elastomeric elements can, without stopping the drive, be monitored via the indicator plate that is visible during rotation of the coupling.

15 Further specific features of the present invention will be described in detail subsequently.

#### Description of Preferred Embodiments

Referring now to the drawings in detail, the elastic coupling  
20 illustrated in Fig. 1 is an elastic cam or jaw coupling. This coupling comprises a first coupling part 2, which is connected with the shaft 1 of a drive motor, and a second coupling part 4, which is connected with

the shaft 3 of a work machine. Disposed in the first coupling part 2, along a circular arc, are a plurality of pockets that are spaced from one another; a respective elastomeric element 5 is inserted into each of the pockets. The second coupling part 4 is provided with projections 6 that respectively extend into the first coupling part 2 into the free spaces between the elastomeric elements 5.

The transfer of torque from the motor shaft 1 to the work machine shaft 3 is effected via the elastomeric elements 5 and the projections 6. In this connection, the elastomeric elements 5 essentially determine the transfer characteristics of the coupling. A coupling gap 7 remains between the two coupling parts 2 and 4. As a consequence of the elastomeric elements 5, when subjected to torque the first coupling part 2 and the second coupling part 4 are at a relative angle of torque relative to one another, which is visible at the coupling gap 7. Instead of the elastic cam coupling that was described, other elastic couplings could also be utilized that also contain elastomeric elements, such as elastic bolts, beads, disks, or intermediate ring couplings.

Disposed on the outer edge of the second coupling part 2, which edge is adjacent to the coupling gap 7, is a marking 8. Secured centrally relative to the marking 8 on the outer edge of the first coupling part 2, which edge is also adjacent to the coupling gap 7, is an

indicator plate 9. The marking 8 and the indicator plate 9 can be disposed on the coupling parts 2,4, for example, by labels, by engraving, by lacquering, or by some other similar method.

5 When the coupling is subjected to torque, the relative angle of torque between the first and second coupling parts 2, 4 effects a relative displacement of the marking 8 and of the indicator plate 9 relative to one another. The relative displacement represents the sum of joint play resulting during assembly, of elastic deformation of the elastomeric elements 5 due to the torque, as well as of wear of the  
10 elastomeric elements 5. The position of the marking 8 and indicator plate 9 relative to one another is hence an indication for the wear condition of the elastomeric elements 5.

The indicator plate 9 comprises a scale, which preferably contains a numerical or digital sequence 10. The digit 0 of the scale  
15 represents the position of the coupling parts 2,4 relative to one another when the coupling is not running. The scale of the indicator plate 9 preferably also has a plurality of indication fields, for example a central indication field 11 and two side indication fields 12. In this connection, the central indication field 11 represents the permissible range, and the  
20 two side indication fields 12 represent the impermissible range, of the wear condition of the elastomeric elements 5. By means of the numerical or digital sequence 10, or the indication fields 11, 12, the

progress of the wear can be plotted against time, and the wear condition can be quantified.

5 In operation, in other words with a coupling that is rotating at nearly constant speed, the position of the indicator plate 9 and the marking 8 is made visible via a conventional strobe light having an infinitely adjustable flash frequency. The strobe light is combined with the coupling in such a way that the intermittent beam of the strobe light is directed onto the marking 8 and the indicator plate 9. With the aid of a measurement and control unit, the speed of the coupling and the flash frequency of the strobe light are measured and compared with one another. The flash frequency of the strobe light is set in such a way that it is synchronized with the speed of the coupling.

15 Pursuant to the official machine guidelines of the European Union, the coupling is to be surrounded at a radial spacing by a tubular coupling guard. The coupling guard 13 is provided with inspection openings or apertures 15 that enable the light of the strobe lamp 14 to fall upon the marking 8 and the indicator plate 9. Further inspection openings that are offset thereto permit the position of the marking 8 and indicator plate 9 to be read. This eliminates the otherwise conventional disassembly and subsequent reassembly of the coupling guard.

The specification incorporates by reference the disclosure of German priority document 102 53 092.0 filed November 13, 2002.

5 The present invention is, of course, in no way restricted to the specific disclosure of the specification and drawings, but also encompasses any modifications within the scope of the appended claims.